

High Power Activity: NASA's Deep Impact Mission

Decision Making

PUBLIC FORUM ROLE SHEET

Vice President, Space Video, Inc.

Space Video, Inc. seeks to fund the purchase, installation, and operation of an additional camera(s) on the Deep Impact spacecraft to enable full coverage of the Deep Impact mission. The image enhancements are outlined below.

- Add up to four small cameras to the flyby spacecraft. Cameras could relay images of the:
 - ☐ Impactor as it moves away from flyby to determine release velocity.
 - ☐ Comet nucleus during approach.
 - ☐ Dust shields to show images of dust impacts.
 - ☐ High Gain Antenna (HGA) gimbal to show antenna pointing.
 - ☐ Solar arrays to show proper functioning to provide power to spacecraft.
- Add up to two similar cameras to the impactor. Cameras could relay images of:
 - ☐ Flyby as the impactor moves away to determine release velocity.
 - ☐ Dust shields to show images of dust impacts.

As a partner in this small corporation, you have a great desire to obtain funding for this project because:

1. Working with NASA will move Space Video, Inc. ahead of its competitors.
2. You have just purchased all the equipment needed to support this project.
3. You have always been a space enthusiast and volunteer at your local planetarium.

The flyby cameras take up to 1 kg (2 lbs) from mass margin. In addition, Space Video, Inc. will be provided special access to mission team members and to mission information to aid in the production of Space Video, Inc. television and online programming.

Mission Scientists

As a mission scientist, meeting the science objectives of the mission is your top priority. These include meeting the following goals.

1. Hitting the nucleus of a comet with sufficient kinetic energy to form a crater with a depth greater than 20 meters.
2. Observing the nucleus for more than 10 minutes following impact.
3. Recording images of the nucleus impact, crater development, and the interior of the crater.
4. Obtaining spectrometry of the nucleus and interior of the crater. (***Spectrometry** provides measurements of energy that enable scientists to analyze the structure and composition of objects.*)
5. Acquiring, storing, formatting, and down linking the imagery and spectrometry data.

You have been interested in comets all of your life, and you see this mission as the best opportunity to make new discoveries about the inside of a comet. You consistently avail yourself of all of the options for obtaining data. You realize that much of the funding for this mission involves the use of onboard instruments that will take pictures of the impact and send these images to the Earth.

The scientists are divided on the matter of putting an additional camera(s) on the spacecraft. Some see the value in getting visual images of the spacecraft, while others do not see the scientific value of these images. Some scientists see the additional camera(s) as being a backup to the science cameras, even though the additional camera(s) would not be calibrated and tested for use in the science. The low-resolution video images of the nucleus enable creation of a better three-dimensional model of the nucleus. Other scientists believe that adding an additional camera(s) would increase the risk of the mission.

Mission Engineer

You have worked on many space science missions in the past 20 years. You understand that it is critical to meet the science objectives for this mission. You have managed the design and construction of the spacecraft and most of the science instruments. Knowing the capabilities of the instruments, you question whether placing an additional camera(s) on board the spacecraft justifies the increase of mass to the spacecraft. You are confident that the onboard instruments are the best possible for imaging the impact of the comet. You prefer to simply do everything possible to ensure a successful mission. Most of the engineers see the value of an additional camera(s), as it would verify the release impactor as it leaves the Deep Impact spacecraft. It would provide information during the release of the impactor, which would provide information whether things go right or wrong. However, there is some concern regarding sufficient light to view the spacecraft. Most of the engineers are interested in where this additional camera(s) would reside on the spacecraft.

Space Agency Administrator

You have been a strong advocate for this mission over the years. You personally know the principal investigator and many of the people on the science team. Your interest is that the mission is as successful as possible while maintaining fiscal responsibility (i.e., working within the limits of a reasonable financial budget). You have overseen past missions in which the spacecraft builder provided instruments that enabled success. During a recent review, you gave the science team high marks for the comprehensive study of the comet by Earth-based observatories that have occurred thus far and will continue throughout the launch of the mission.

Astronomer

You have been observing far-away objects in our solar system for the last 30 years. You were the co-discoverer of several Kuiper Belt objects during your time at a major observatory. You feel that the images from an additional camera(s) might be beneficial in order to see the impact in "stereo," even though the additional camera(s) would not be calibrated to provide good science information. You hope to use the images to confirm your theories of the composition of comets, which will give us a better picture of the origin of our solar system. You are opposed to light pollution, which may be caused by people who use lighting fixtures that cause the light to shine into the sky. Light pollution makes it difficult for amateur astronomers to see objects in the nighttime sky. You are interested in working with amateur astronomers in getting images of the impact from the Deep Impact and future comet missions.

Education and Public Outreach Manager

As an education and public outreach manager, your job is to provide educators and the general public with information and educational materials about the Deep Impact mission. Your goal is to increase public interest in space science as well as increase student awareness of space-related careers. You see the decision being made in the mission planning as a great example of the processes people need to make in their everyday lives. You are strongly in favor of getting additional images of the spacecraft. These images could be used in conjunction with planned educational activities that would be interesting to many people who are following the mission.

- An additional camera(s) could provide the public with a number of new images of space.
 - First-ever imaging sequence showing spacecraft separation in deep space.
 - First-ever images of actual dust hits damaging the spacecraft dust shields.
 - First-ever imaging sequences of hardware deployment and communication in deep space.

Write your own roles here.
